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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
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ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/728,393	GENG, Z. JASON	
	Examiner	Art Unit	
	CHRISTOPHER K. PETERSON	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *32-36,61,62 and 65-72* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *32-36,61,62 and 65-72* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/15/2009 has been entered.

Response to Amendment

1. The Amendment After RCE filed on 6/15/2009 has been received and made of record. Examiner notes that the Applicant has amended claims 32, 34, 61, and 62. Claims 1 – 31 and 40 - 59 are now cancelled and claims 37 – 39, 60, 63, and 64 are withdrawn. New claims 65 – 72 were added. Claims 32 – 36, 61, 62, and 65 - 72 are pending in this application. Examiner acknowledges the change in the claim identifier on claims 60 - 64 from original to withdrawn (claim 60, 63, and 64) or currently amended (claims 61 and 62).

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. Claims 32 – 36, 61, 62, and 65 - 72 are rejected under 35 U.S.C. 102(e) as being anticipated by Yukhin (US Patent Pub. # 2003/0235335).

As to claim 32, Yukhin (Figs. 4, 5, and 6) teaches a high speed 3D surface imaging camera comprising:

- a light projector (illuminating unit 401) for selectively illuminating an object, (Para 54) said light projector (401) being configured to project three sequential light beam projections having different colors (light source 510A-510N) and different spatially varying intensity patterns (SLMs 515A-515N) from said projector (401) onto said object (Para 54 and 60 – 63). Yukhin teaches control unit 402 may control the spatial structure of the projected patterns that is control unit 402 may control whether illuminating unit 401 illuminates objects in an area evenly or whether it projects a pattern onto the objects. Control unit 402 may also control temporal functions, such as the length of time or frequency of the illumination. In addition, control unit 402 may also control spectral modulations, such as, for example, the wavelength of the generated light (Para 54). Yukhin teaches "N" hereinafter represents a variable (Para 60). Examiner analyzes the limitation “N” to mean 3. Yukhin teaches the SLMs 515A-515N may be used as code masks with, for example, patterns such as

grids, or line structures and used for determining a pattern of light projected onto the object 560 (Para 63).

- an image sensor (detector 642A – 642N) configured to receive reflected light from said object (object 695) and to generate three separate color image data sets (signal processor 660A – 660N) based on said three sequential differently colored (light source 510A-510N), variable intensity pattern light beam projections (SLMs 515A-515N) said three separate color image data sets (660A – 660N) providing said 3D image data of said object (695) (Para 58, 66 – 68, and 75). Yukhin teaches the control unit 406 transmits timing and control signals to detecting unit 405 (Para 58). Yukhin teaches the resultant processed digital signal such as reconstructed 3D topology from signal processors 660A-660N may be accumulated in electronic unit 690. For example, processor 670 of electronic unit 690 may sum the signals received from each of signal processors 660A-660N to create an "overall" digital image (Para 75).

As to claim 33, Yukhin teaches the high speed 3D surface imaging camera of claim 32, wherein said image sensor comprises a plurality of charge-coupled device sensors (642A- 642N) (Para 68).

As to claim 34, Yukhin teaches the high speed 3D surface imaging camera of claim 33, wherein said plurality of CCD sensors (642A- 642N) comprises 3 CCD monochromic sensors (642A- 642N) (Para 68 and 73). Yukhin teaches additional lens 620A-620N may be located in each of the N channels formed by beam splitter 615 and

project images of the structured illumination distorted by an object's surface onto detectors 642A-642N (Para 68). Examiner reads N channels to mean 3 CCD sensors. Yukhin teaches structured illumination using differing spectral ranges is used; each of the N spectral ranges is registered by at least one corresponding photoregistrar of identical spectral sensitivity. Examiner analyzes “N spectral ranges are registered by at least one corresponding photoregistrar” to mean each photoregistrar (Fig. 5 detector 642 and ADC 644) is monochromic and only reads a specific spectral range.

As to claim 35, Yukhin teaches the high speed 3D surface imaging camera of claim 32, further comprising a computing device (electronic unit 690) communicatively coupled to said image sensor (642A – 642N) wherein said computing device (690) is configured to combine said separate color image data sets (660A – 660N) into a composite Rainbow-type image of said object (Para 70 - 75). Yukhin teaches the resultant processed digital signal such as reconstructed 3D topology from signal processors 660A-660N may be accumulated in electronic unit 690. For example, processor 670 of electronic unit 690 may sum the signals received from each of signal processors 660A-660N to create an "overall" digital image (Para 75).

As to claim 36, Yukhin (Fig. 4 and 5) teaches a control unit (402) which produces sequential color projections comprises one of a rotatable color wheel, a deformable mirror, or a sequential RGB light emitting diode array (Para 53 and 54). The one or more light source 510A-510N can generate light of a different spectral range, for example, ranges of the ultraviolet, visible and infra-red spectra of electromagnetic radiation (Para 61). Yukhin teaches a signal processor 420 that controls the control unit

402 for the illuminating unit 401 and control unit 406 for the detecting unit 405. Yukhin teaches the illuminating unit 401 may be any suitable light-emitting device such as, for example, laser, light-emitting diode ("LED"), inert gas lamp, incandescent lamp or other working in visible, ultraviolet or infrared range. In certain embodiments, the illumination is provided by a flash or strobe light, which has a very short duration and consequently may be preferable when illuminating moving objects (Para 53).

As to claim 61, Yukhin teaches the high speed 3D surface imaging camera of claim 32, further comprising a computing device (electronic unit 690) communicatively coupled to said image sensor (642A – 642N), wherein said computing device (690) further comprises a mosaic means configured to combine said three separate color image data sets (660A – 660N) to form a multi-view 3D image of said object (Para 70 – 75).

As to claim 62, Yukhin teaches the high speed 3D surface imaging camera of claim 34, wherein each of said 3 CCD monochromatic sensors (642A - 642N) comprise a matched narrow-band spectral filter (beam splitter 615) disposed in front of said CCD sensor (642A - 642N) (Para 72 and 73). Yukhin teaches structured illumination using differing spectral ranges is used; each of the N spectral ranges is registered by at least one corresponding photoregistrar of identical spectral sensitivity (. Thus, each image of the structured illumination distortions, formed by heterogeneities of a shape of the object surface, is registered in at least one channel of at least one multi-channel unit of image registration and processing.

As to claim 65, Yukhin (Figs. 4, 5, and 6) teaches a 3D imaging camera comprising:

- a light projector (illuminating unit 401) for selectively illuminating an object, (Para 54) said light projector (401) being configured to project a number of sequential light beam projections having different wavelengths (light source 510A-510N) and different spatially varying intensity patterns (SLMs 515A-515N) from said projector (401) onto said object (Para 54 and 60 – 63). Yukhin teaches control unit 402 may control the spatial structure of the projected patterns that is control unit 402 may control whether illuminating unit 401 illuminates objects in an area evenly or whether it projects a pattern onto the objects. Control unit 402 may also control temporal functions, such as the length of time or frequency of the illumination. In addition, control unit 402 may also control spectral modulations, such as, for example, the wavelength of the generated light (Para 54). Yukhin teaches "N" hereinafter represents a variable (Para 60). Examiner analyzes the limitation “N” to mean a number. Yukhin teaches the SLMs 515A-515N may be used as code masks with, for example, patterns such as grids, or line structures and used for determining a pattern of light projected onto the object 560 (Para 63).
- an image sensor (detector 642A – 642N) configured to receive reflected light from said object (object 695) and to generate a number of separate color image data sets (signal processor 660A – 660N) based on said a

number of sequential differently colored (light source 510A-510N), variable intensity pattern light beam projections (SLMs 515A-515N) said three separate color image data sets (660A – 660N) providing said 3D image data of said object (695) (Para 58, 66 – 68, and 75). Yukhin teaches the control unit 406 transmits timing and control signals to detecting unit 405 (Para 58). Yukhin teaches the resultant processed digital signal such as reconstructed 3D topology from signal processors 660A-660N may be accumulated in electronic unit 690. For example, processor 670 of electronic unit 690 may sum the signals received from each of signal processors 660A-660N to create an "overall" digital image (Para 75).

As to claim 66, Yukhin teaches the 3D imaging camera claim 65, in which said light projector (401) is further configured to project light beams in the near infrared spectrum (infrared range), and said image sensor (642A – 642N) is further configured to receive light in the near infrared spectrum (Para 53 and 73). Yukhin teaches structured illumination using differing spectral ranges (infrared spectrum) is used, each of the N spectral ranges is registered by at least one corresponding photoregistrar (640A – 640N) of identical spectral sensitivity (Para 73).

As to claim 67, Yukhin teaches the 3D imaging camera claim 65, in which said image sensor (642A – 642N) is configured to receive said number of sequential light beam projections (510A-510N) sequentially within a single frame cycle (Para 95). Yukhin teaches the system can continuously capture 3D images at a fast rate; the probability of error is low and decreases as the number of frames taken increases.

As to claim 68, Yukhin teaches the 3D imaging camera claim 65, in which said image sensor (642A – 642N) comprises a number of charge-coupled device (CCD) sensors (Para 55).

As to claim 69, Yukhin teaches the 3D imaging camera claim 68, in which said CCD sensors (642A- 642N) comprises monochromatic CCD sensors (642A- 642N) (Para 68 and 73). Yukhin teaches additional lens 620A-620N may be located in each of the N channels formed by beam splitter 615 and project images of the structured illumination distorted by an object's surface onto detectors 642A-642N (Para 68). Examiner reads N channels to mean 3 CCD sensors. Yukhin teaches structured illumination using differing spectral ranges is used; each of the N spectral ranges is registered by at least one corresponding photoregistrar of identical spectral sensitivity. Examiner analyzes “N spectral ranges are registered by at least one corresponding photoregistrar” to mean each photoregistrar (Fig. 5 detector 642 and ADC 644) is monochromic and only reads a specific spectral range (Para 73).

As to claim 70, Yukhin teaches the 3D imaging camera claim 65, further comprising a computing device (electronic unit 690) communicatively coupled to said image sensor (642A – 642N) in which said computing device (690) is configured to combine said separate image data sets (660A – 660N) into a composite Rainbow-type image of said object(695) (Para 70 – 75). Yukhin teaches the resultant processed digital signal such as reconstructed 3D topology from signal processors 660A-660N may be accumulated in electronic unit 690. For example, processor 670 of electronic

unit 690 may sum the signals received from each of signal processors 660A-660N to create an "overall" digital image (Para 75).

As to claim 71, Yukhin teaches the 3D imaging camera claim 68, in which each of said charge-coupled device (CCD) sensors (642A - 642N) comprise a matched narrow-band spectral filter (beam splitter 615) disposed in front of said CCD sensor (642A - 642N) (Para 72 and 73). Yukhin teaches structured illumination using differing spectral ranges is used, each of the N spectral ranges is registered by at least one corresponding photoregistrar of identical spectral sensitivity (Para 73). Thus, each image of the structured illumination distortions, formed by heterogeneities of a shape of the object surface, is registered in at least one channel of at least one multi-channel unit of image registration and processing.

As to claim 72, Yukhin teaches the 3D imaging camera claim 68, in which each of said number of sequential light beam projections (510A-510N) projects light in a unique spectrum band (visible, ultraviolet or infrared range) corresponding to one of said charge-coupled device (CCD) sensors (642A – 642N) (Para 53 and 73). Yukhin teaches structured illumination using differing spectral ranges (infrared spectrum) is used, each of the N spectral ranges is registered by at least one corresponding photoregistrar (640A – 640N) of identical spectral sensitivity (Para 73).

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lu (US Patent # 6,252,623) cites a three dimensional imaging system.

Yukhin (US Patent # 7,257,236) is the US Patent for the prior art used in the above rejection.

Shiratani (US Patent Pub. # 2002/0075456) cites a 3D image acquisition apparatus and 3D image acquisition method.

Inquiries

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER K. PETERSON whose telephone number is (571)270-1704. The examiner can normally be reached on Monday - Friday 6:30 - 4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tran Sinh can be reached on 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. K. P./
Examiner, Art Unit 2622
8/20/2009

/Sinh Tran/
Supervisory Patent Examiner, Art Unit 2622